Acoustics - Rapid COTS Insertion
COTS Symposium

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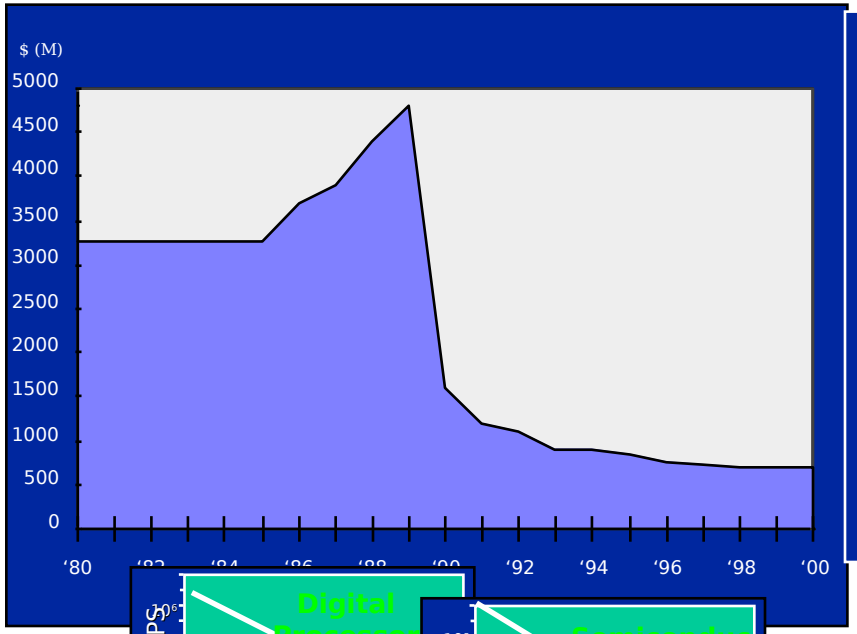
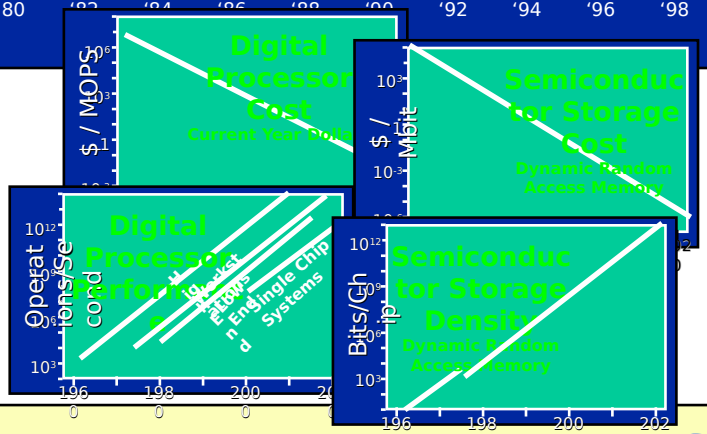
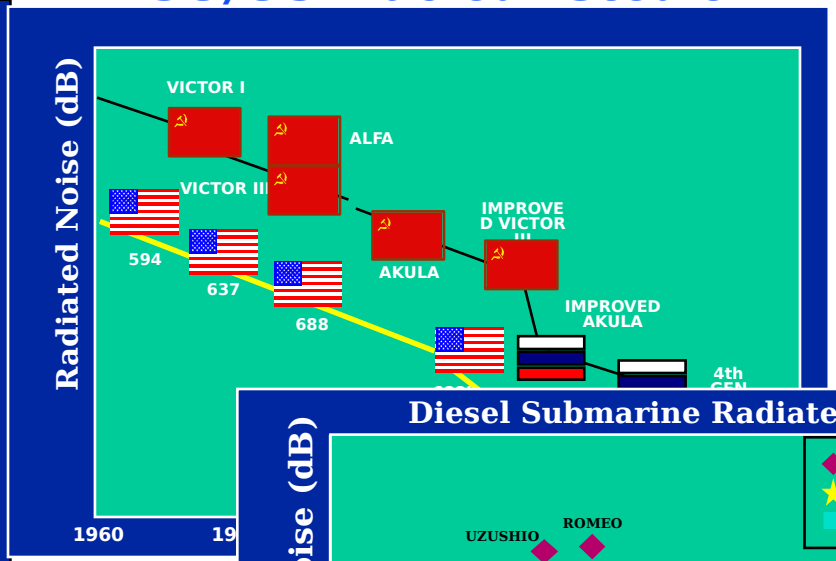
Fact of Life Challenges

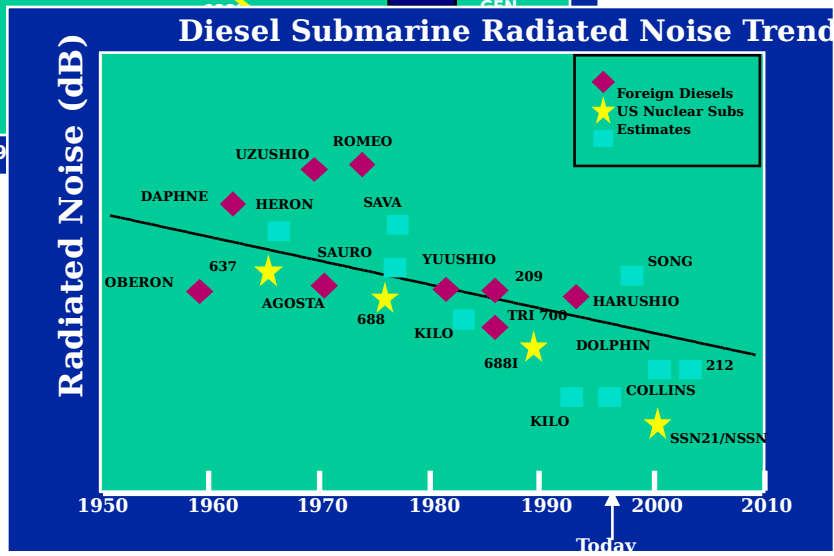
SUBMARINE R&D





FSU/US Nuclear Stealth





Leverage US industry to provide affordable solution

Findings: Systemic

- There is no “quick-fix” to the sonar problem.
- There is no focussed technical management with detailed knowledge of (i.e. to the IUSS community) and responsibilities across submarine sonar system boundaries.
- Priorities in submarine sonar programs have been driven by a target rich environment toward highly integrated combat systems capable of handling multiple targets.
- There is a lack of innovative progress, which is always the result of experimentation and iteration (i.e. build-test-build)
  - Yet, in 18 months SURTASS built and fielded in operational prototype a complete twin-line array system and began testing in operationally significant littoral waters.

Evolutionary Sonar Improvement Program

- **Establish and maintain a process to rapidly improve sonar system effectiveness with the following characteristics:**
  - **Evolutionary improvements through iteratively exploiting the lessons learned in a "build-test-build" program**
  - **Focus on at-sea experimentation and data analysis**
  - **Utilization of encounter data recorded in existing systems**
  - **Signal Processing Innovations**
    - ***Implementation via COTS insertion in open architecture***
    - ***Developing and testing prototype systems in parallel to BSY-1/2 systems***
  - **Fleet involvement in testing and improvement of prototypes**
    - ***Fielding limited numbers of prototypes in forward deployed submarines***
- **Primary thrusts of this sonar improvement program are contained in the recommendations to follow**

Acoustics Rapid COTS Insertion

A-RCI Objectives

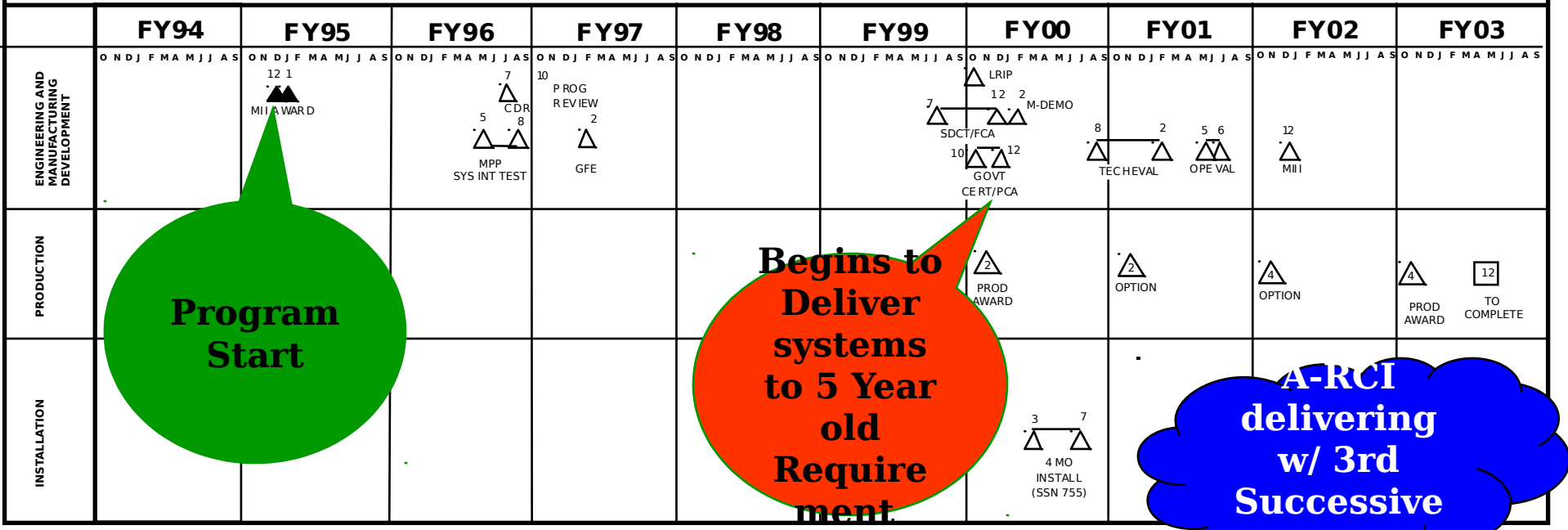
- Achieve dB Gains Faster
- Deliver Additional Acoustic Improvements
- Make Improvements Applicable to all SSN 688, 688I, and SSBN 726 Class Submarines (and Not All Linked to TB-29)
- Implement COTS Based Open System
  - Increased Processing Capacity
  - Growth Potential
  - Reduced Cycle Time for Future Upgrades
  - Better return on Development Dollars
  - Space/Weight Reduction

A-RCI was Designed to Meet these Objectives

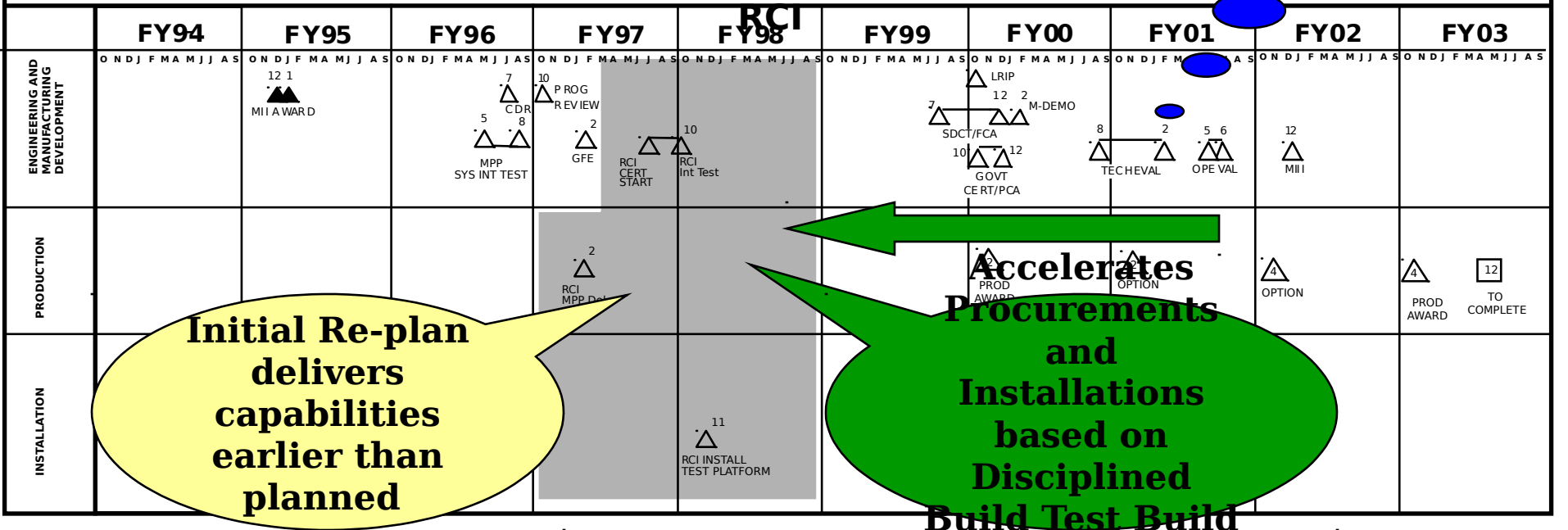
Acoustics Rapid COTS Insertion Acquisition Strategy

- Leverage, Leverage, Leverage
- Maximum use of COTS/NDI
- Institutionalize software Re-Use
- Pooled several standalone legacy system upgrades into single COTS-based development program
- Share talents and resources between Program Offices

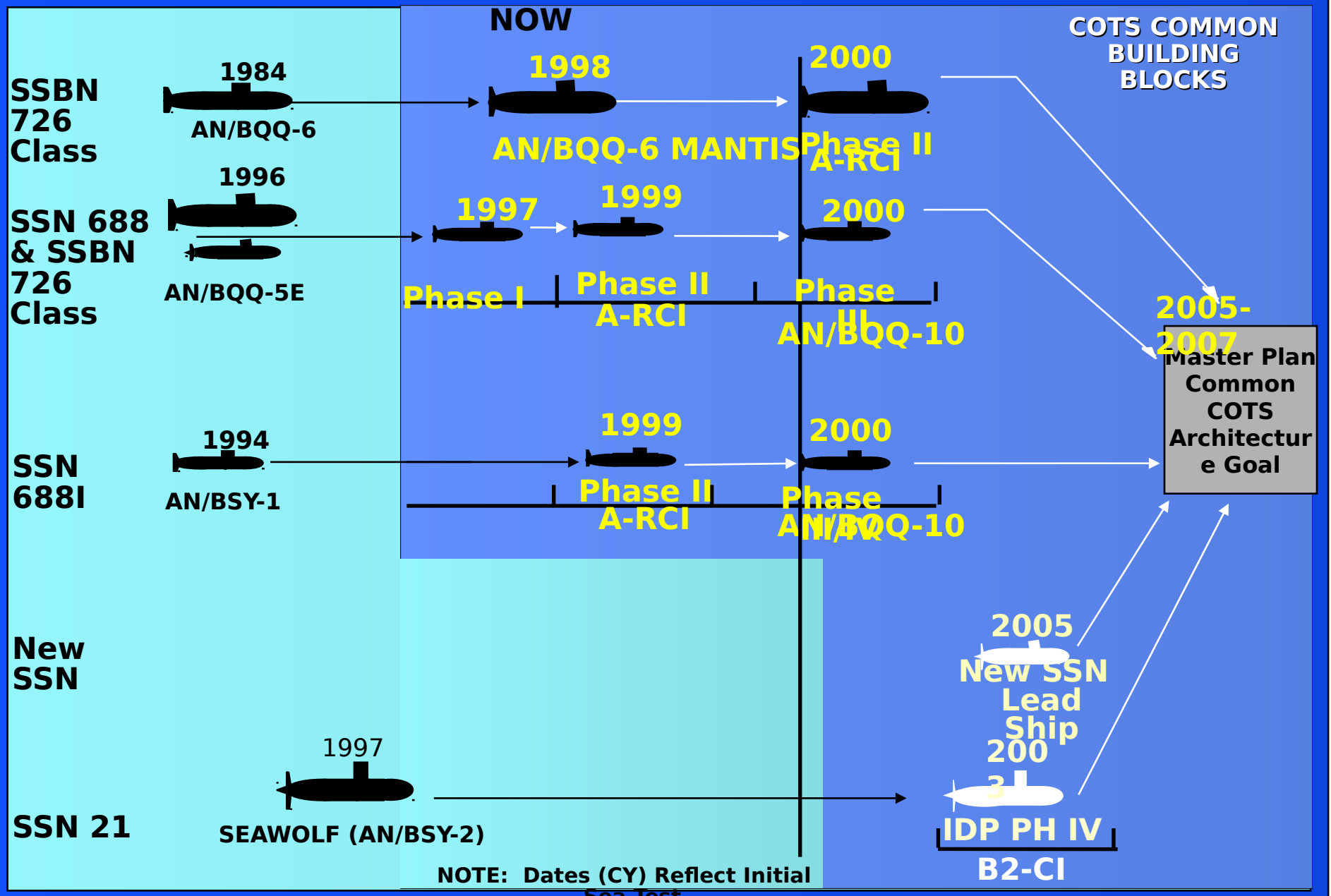
AN/BSY-1 ECP 1000 DEVELOPMENT SCHEDULE



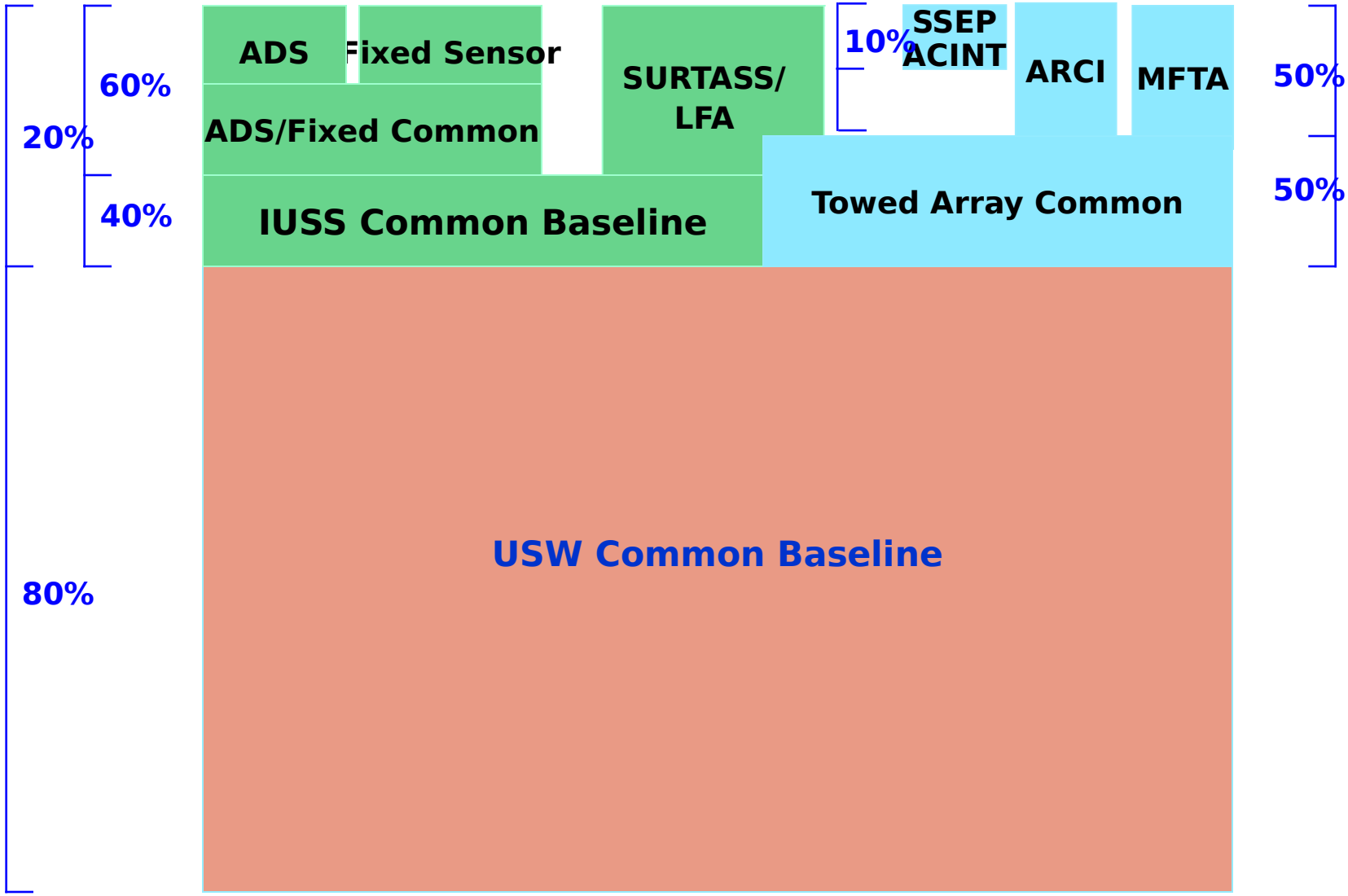
AN/BSY-1 ECP 1000 DEVELOPMENT SCHEDULE WITH RCI



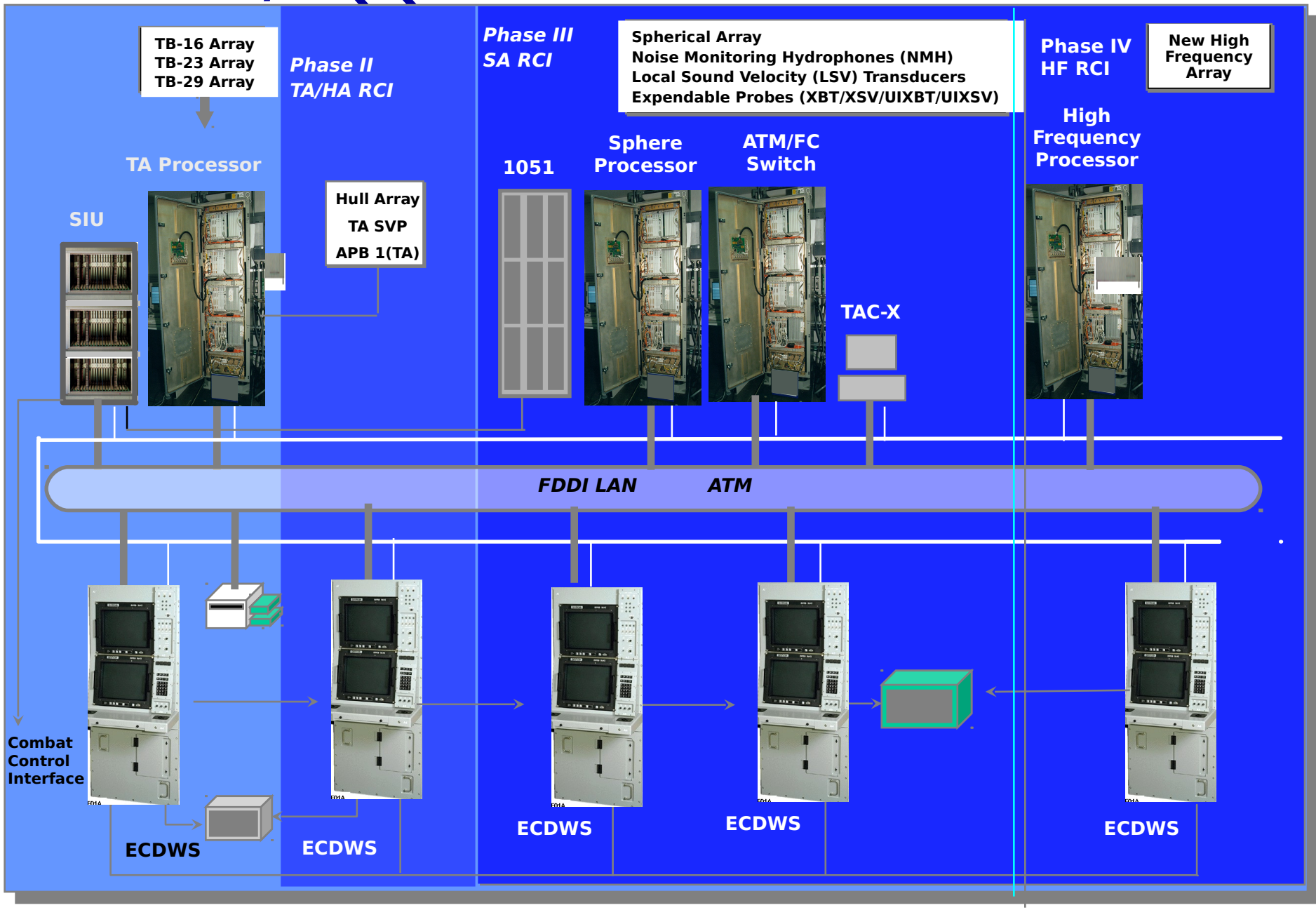
Acoustic Master Plan



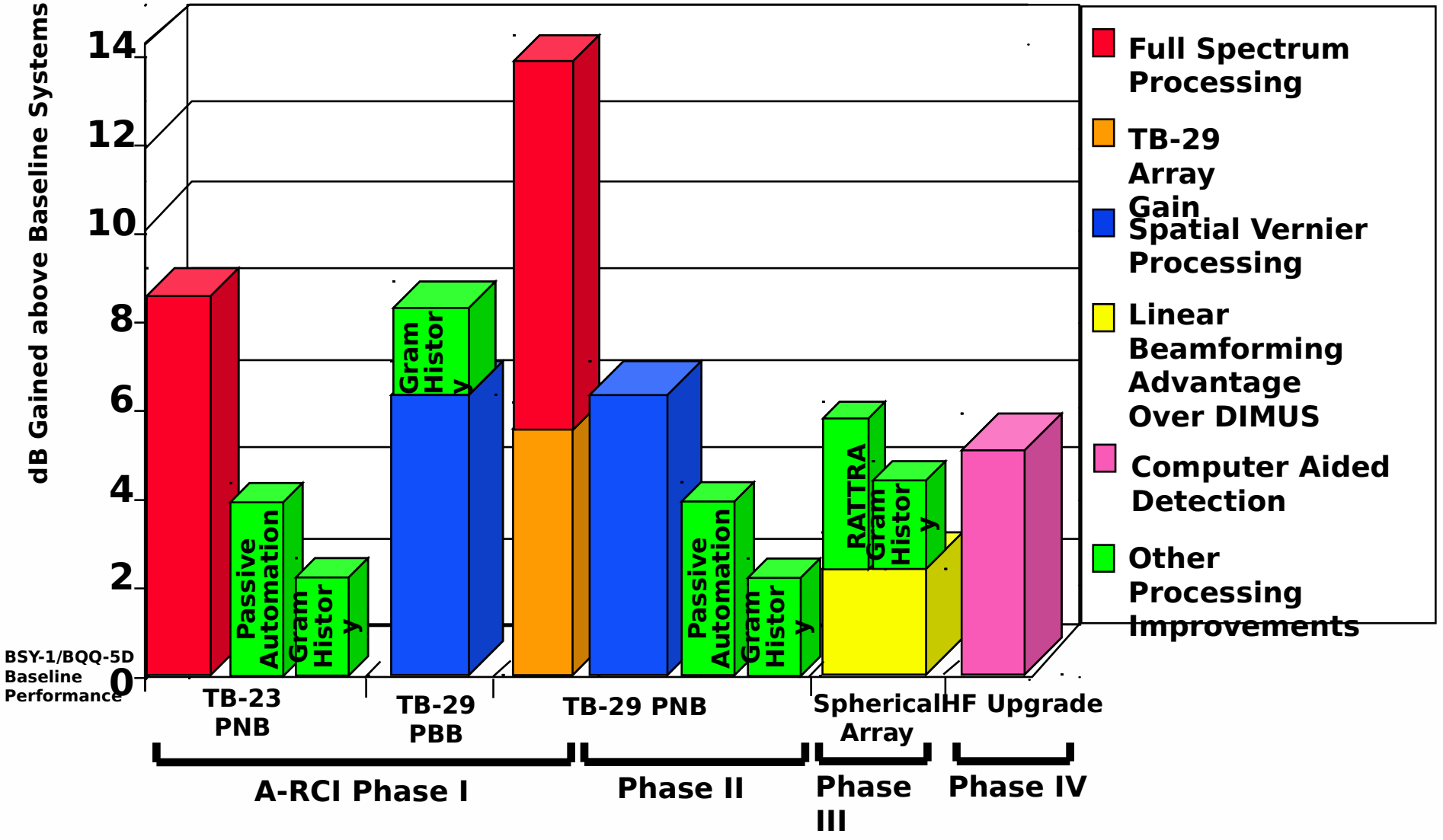
A-RCI Software Commonality



-RCI = AN/BQQ-10 IMPLEMENTATION + APB



Demonstrated Performance Gains



Acoustics Rapid COTS Insertion Acquisition Reform Accomplishments

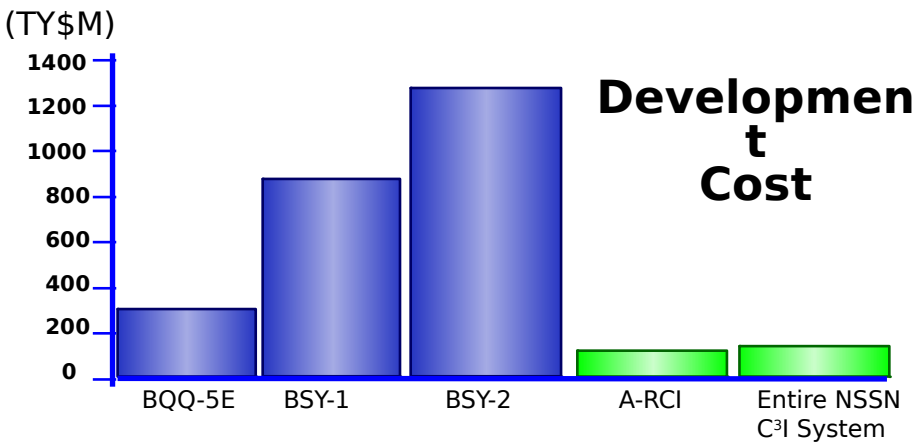
- **Increased early involvement of OPTEVFOR to Streamline Operational Testing**
- **Minimized Use of MIL-STDs**
  - **Original ECP 1000 SOW contained 81 Military Unique Standards/Specifications**
    - **44 Eliminated**
      - **16 Replaced with Commercial Specifications**
      - **21 Retained as Guidance**
      - **A-RCI Eliminated 5 Additional, Added 3 as Guidance**
  - **Original ECP 1000 PIDS contained 68 Military Unique Specifications**
      - **58 Eliminated**
      - **2 Replaced with Commercial Specifications**
      - **4 Retained as Guidance**
      - **4 Retained Mandatory (Waiver Granted)**
        - **Primarily Interface/Shock and Vibration**
      - **A-RCI added 12 as Guidance and added 8 Commercial Standards**
- **Formalized Integrated Product Teams**

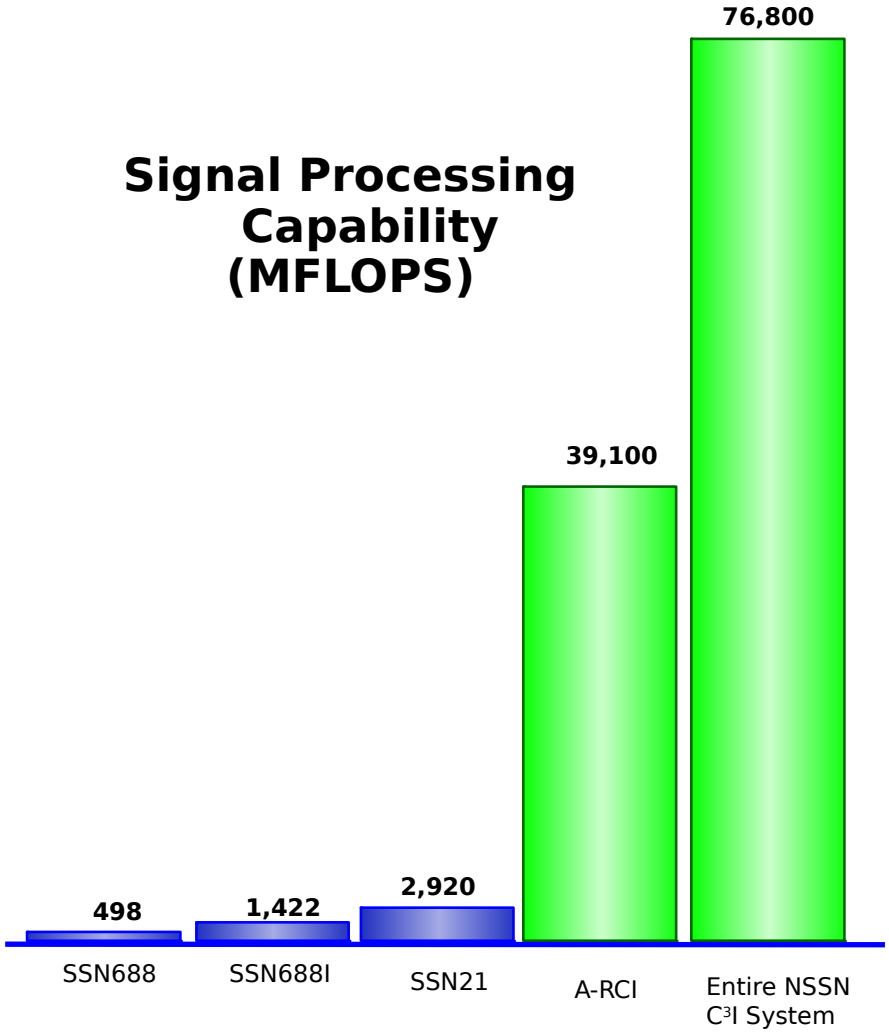
Acoustics Rapid COTS Insertion Streamlined Path to MSII Decision

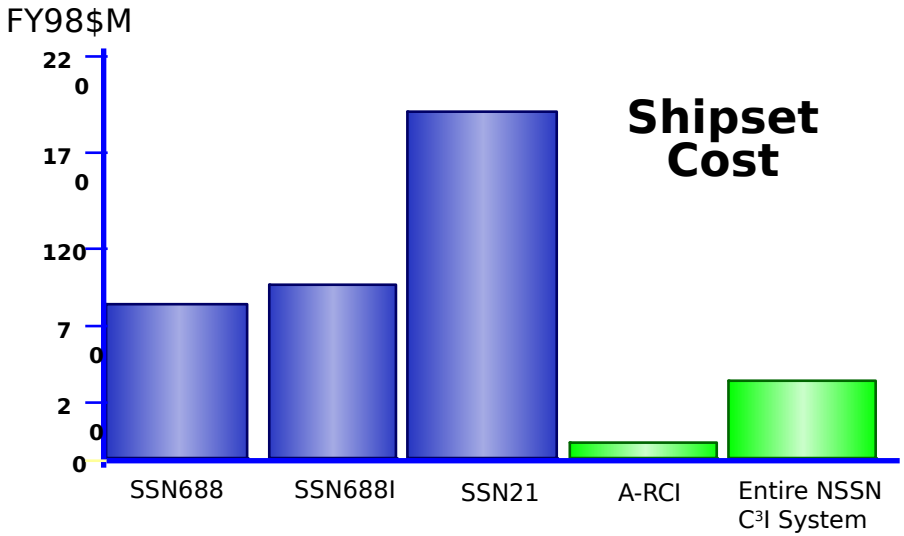
MSII decision achieved in less than 6 weeks using revised DoD 5000 guidance

- **Used Acquisition Coordination Team approach to expedite review of program documentation**
- **Focused MSII decision on key documents -- APB, AP, ASR, TEMP**
- **Combined the many formerly required figures, charts, and tables into a single Integrated Test Program Schedule.**
- **Combined the majority of “program plans” into a single master document**

Submarine Combat System Cost - Reversing the Trend

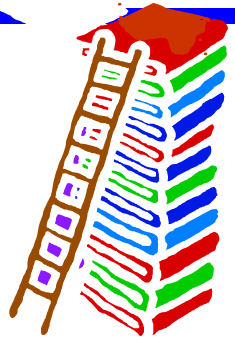




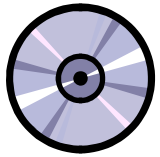


Militarized Legacy Systems COTS Based Systems

Changes to Logistics Support Products



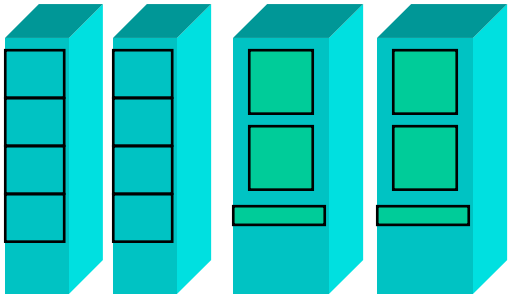
48 Volume
Paper Tech Manual



1 CD IETM

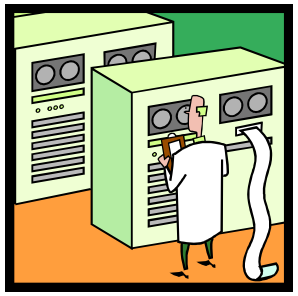
$600 Million
BSY-1 Inventory

Just-In-Time
Support

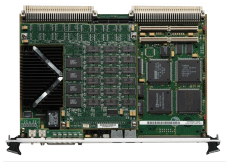


Tactical System
Maintenance Trainer

ICW



Complex
Component Change



A-RCI Component
Integration

New Products Have Smaller Logistics “Tail”

Realized Cost Avoidance

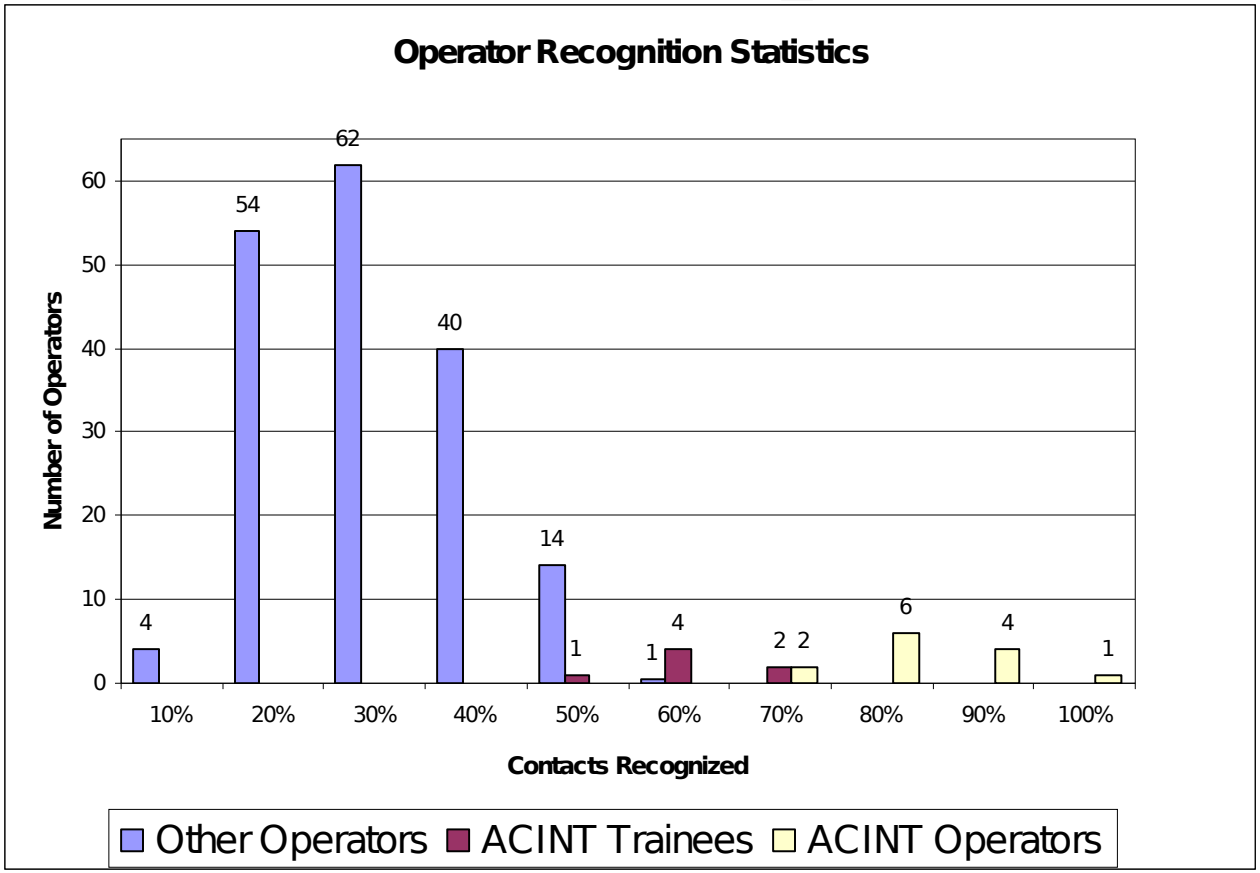
IETM

Direct Vendor Delivery

Interactive Multimedia Instruction

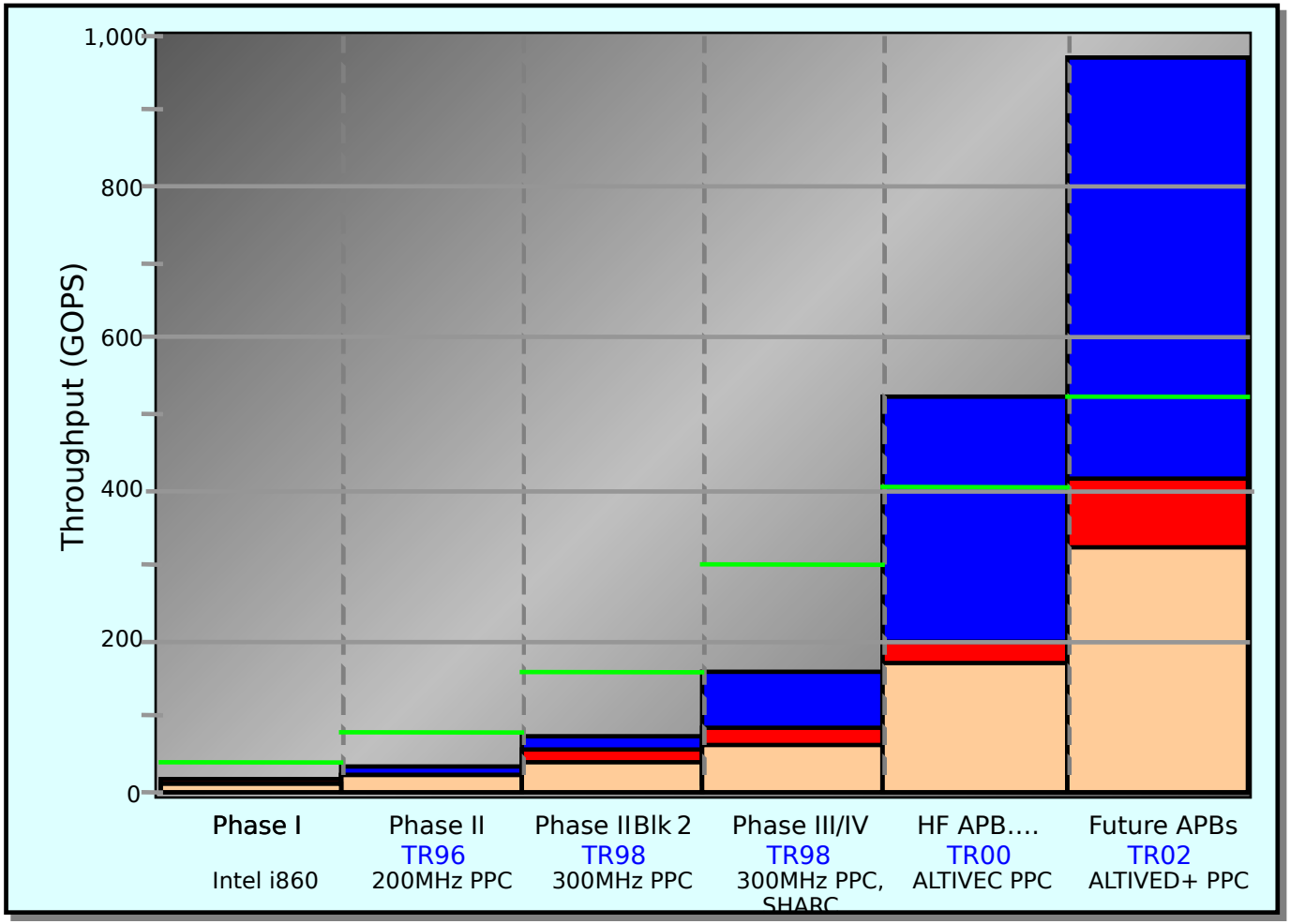
Outfitting Spares Reduction

The Operator in the Loop



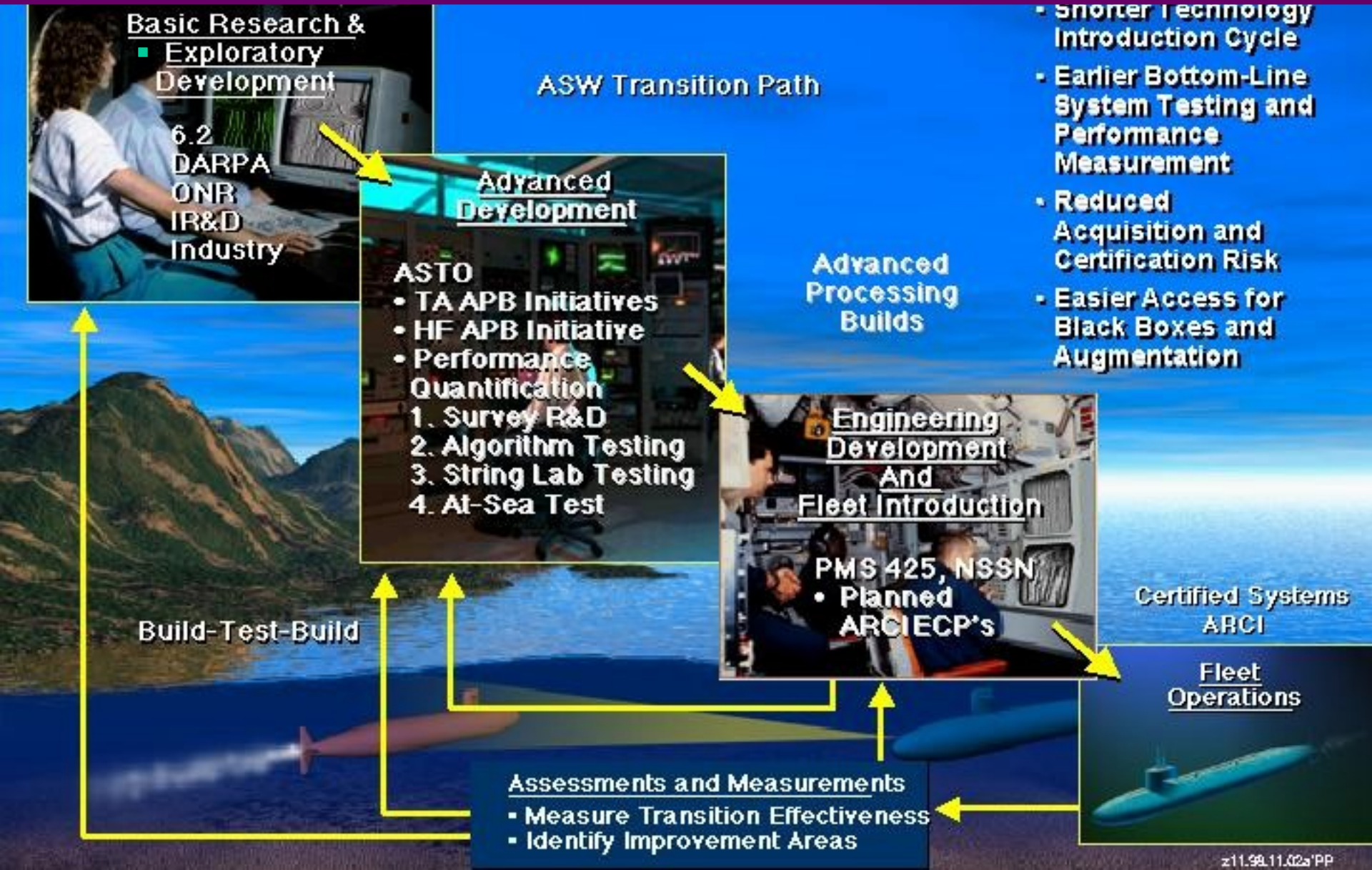
Operator Recognition of Contacts		
OPERATORS	**NUMBER OF OPERATORS**	**PERCENT OF CONTACTS RECOGNIZED**
ACINT Operators	**13**	76%
ACINT Trainees	**7**	57%
Non-ACINT Operators	**174**	25%

ARCI Processing Projection
With Technology Insertion

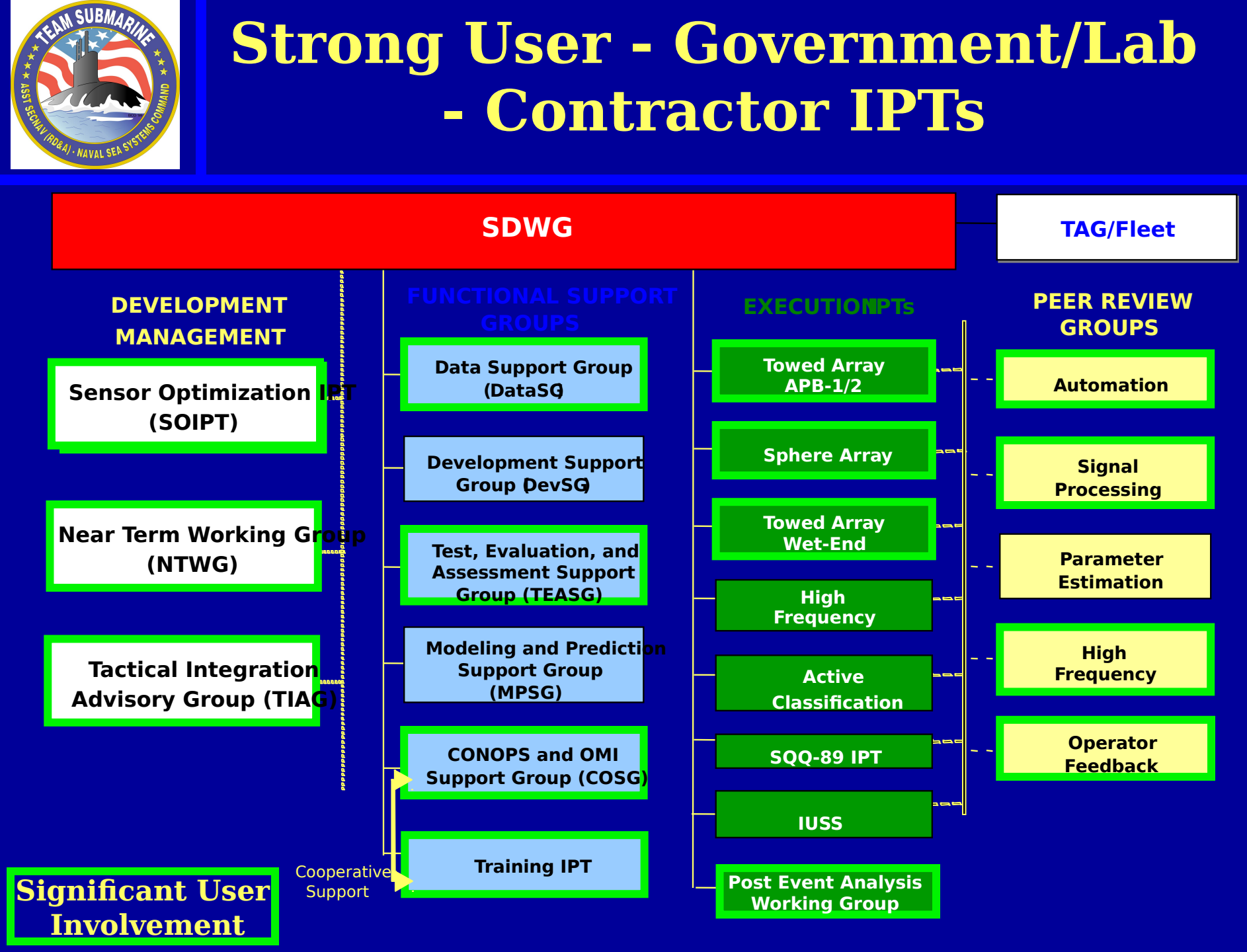


Utilized Processing Capacity
Installed Capacity
Fully Populated Capacity (Max drawers & cabinets)
Latent Demand Estimate
TRxx Technology Model Year

Rapid Technology Transition Process



Strong User - Government/Lab - Contractor IPTs



Towed Array Processing Performance Improvement Trend

	AN/BQQ-5	A-RCI/APB-98	A-RCI/APB-00
Mean Operator Detection Success Rate	23%	49%	87%
Mean # of False Alarms Per Run	1.0	0.92	0.58
Mean Initial Detection & Classification Time (When Detection Occurred)	Baselin e	9 Min Earlier	27 Min Earlier
Mean Contact Holding Time* (When Detection Occurred)	Baselin e	10 Min Longer	25 Min Longer

Improved by a Factor of ~ 4

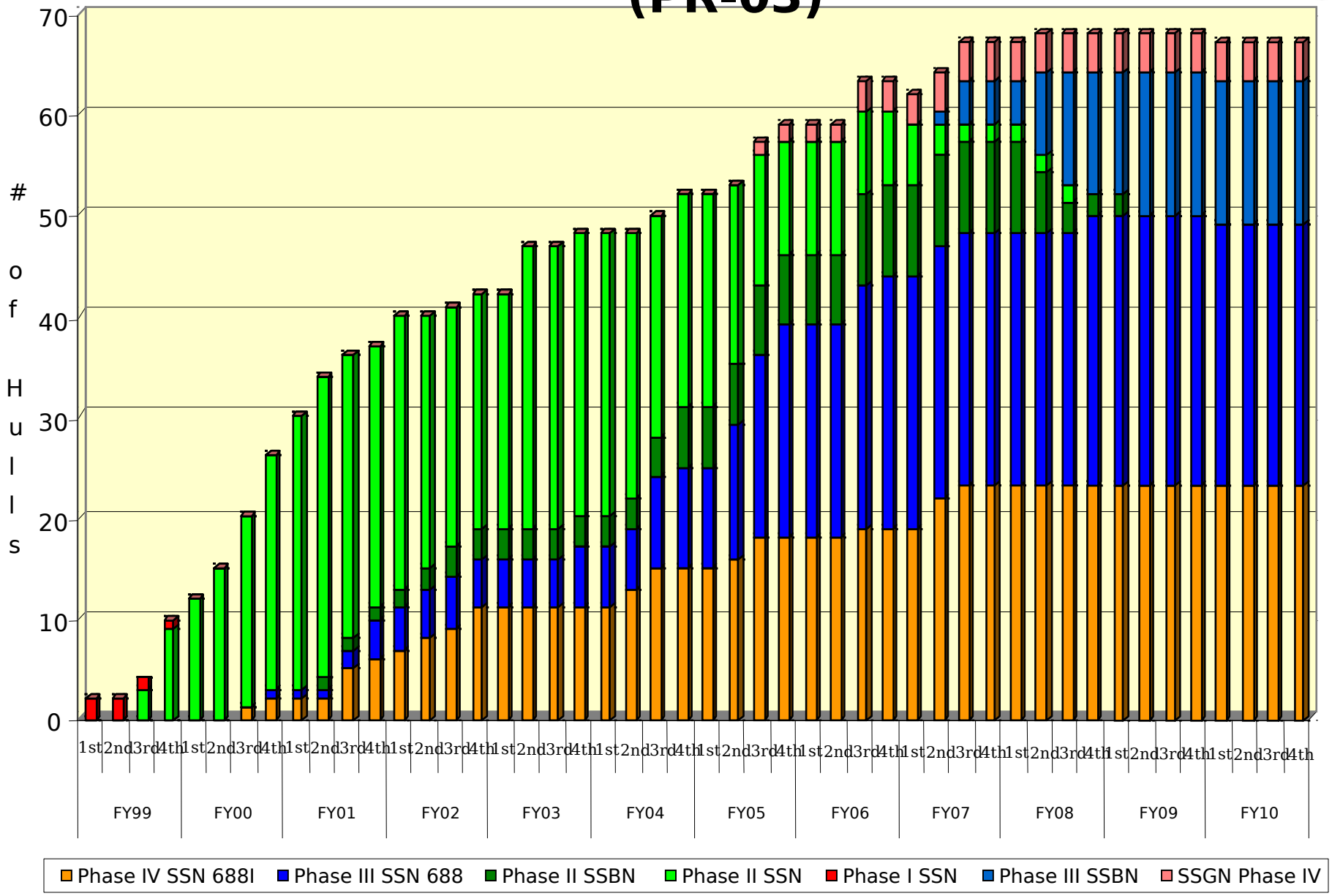
False Alarms Reduced by 40%

Improved by 27 Minutes

Improved by 25 Minutes*

* Measured holding time limited by the length of recorded

A-RCI Installation Profile (PR-03)



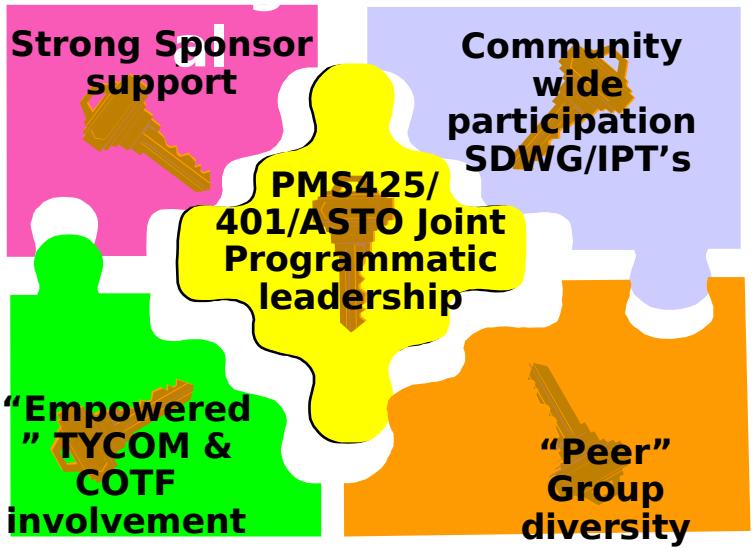
NAVY BUSINESS VISIONS

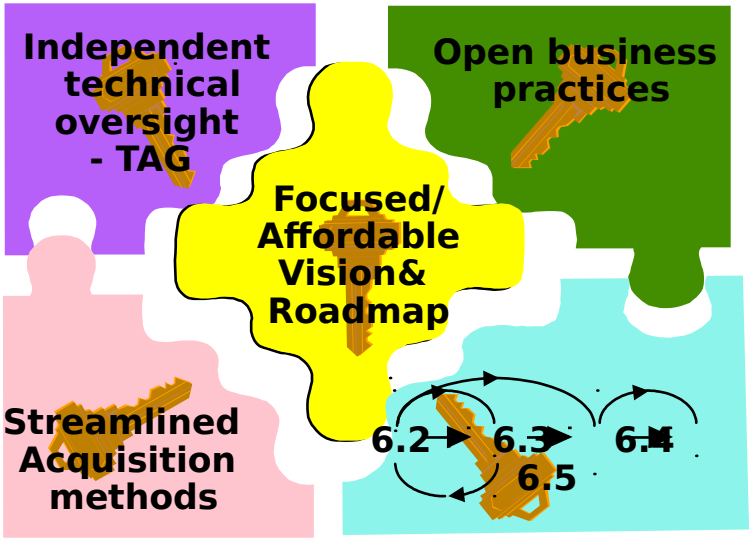
OLD	NEW
Deficient GFE	*System Ownership*
Meet the Spec	*Build-Test-Build*
Follower	*Leader*
Yesterday's Technology	*Today's/Tomorrow's Technology*
Competing Cost Centers	*Teaming Cost Centers*
Overruns	*On Cost, On Schedule, Exceed Perf.*
Builds Computers	*Packages/Interfaces Computers*
Bureaucratic	*Flat Organization*
Inflexible	*"Turn-on-a-Dime"*
6-8 Years Development	*1-2 Years Development*
Pieces & Stove Pipes	*"End-to-End" View*
To-The-Death Competition	*Team w/Competition Day-to-Day*
Re-Invent Wheel	*Improve Wheel*
Near Team Bottom Line	*Long Range Success*
In-Tune w/Spec	*In-Tune w/Threat*
Years of Experience	*New Ideas*
6.5 Only	*6.2 → 6.5*

What's Best for LM → **What's Best for Navy**

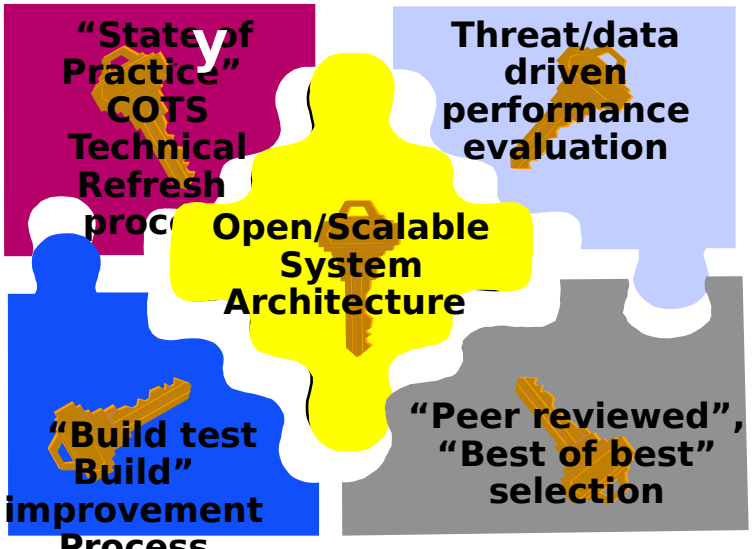
This shift is equally applicable to the Navy, Lockheed Martin & Other Industries Change Across the Board is Needed.

Keys to Success





Focus Leverage Deliver



Submarine Sonar Axioms

1. **Rapid COTS Insertion Means Just That.**
2. **Deliver Each Sensor's Full Theoretical Gain to the Operator: All Bearings, All Frequencies, All the Time.**
3. **Avoid Modifying Successful Commercial Products.**
4. **Use the Lessons Learned.**
5. **Use State of the Practice, not State of the Art; Tactical Sonar Systems are not a Beta Test Site.**
6. **Configuration Management, vice Configuration Control.**
7. **Software Reuse Is Key to Affordability!**
8. **No One Organization Has the Full Story.**
9. **Submarine Acoustic Superiority Depends on the Successful use of these axioms.**

CAPT J. P. Jarabak, USN

CAPT G. L. Sieve, USN

PMS425
ARCI
08/07/97

A-RCI Installation Profile (PR-03)

Technology Insertion Overlay